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ORIGINAL FILE

Ms. Donna R. Searcy
Federal Communications Commission
1919 M Street, N.W. - Room 222
Washington, D.C. 20554

November 6, 1992

Re: Comments of Rose Communications, Inc. in GEN-Docket-90-134

Dear Madam Secretary:

Transmitted herewith are an original and nine copies of Rose's comments in the above referenced proceeding.

If you have any questions with regard to this matter, please do not hesitate to contact me.

Sincerely

John McNulty

President and CEO

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Before the **FEDERAL COMMUNICATIONS COMMISSION** Washington, D.C. 20554

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FEDERAL COMMUNICATIONS COMMISSION OFFICE OF THE SECRETARY

In the Matter of

Amendment of the Commission's Rules to Establish New Personal Communications Services

GEN Docket No. 90-314 ET Docket No. 92-100 ORIGINAL FILE

COMMENTS OF ROSE COMMUNICATIONS, INC.

Respectfully submitted.

John McNulty President and CEO

Rose Communications, Inc.

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SUMMARY

Rose enthusiastically supports the Notice of Proposed Rulemaking. We applaud the FCC's efforts in moving the proceedings along in an expeditious manner as quick action by the FCC will help ensure that the U.S. remains competitive in the wireless communications arena vis a vis Europe and Japan.

The demand for voice services is well documented. However, the spectrum to support that demand far exceeds the limited spectrum identified by the Commission in this proceeding. The proposal to allocate 20 MHz for both voice and high-speed data is insufficient and technically ambitious. Rose recommends an initial allocation of 40 MHz for unlicensed PCS.

The Commission should segregate high speed data services and voice data services into separate subbands. No satisfactory mechanism has been found which permits coexistence of these services with their differing attributes and requirements.

The entire voice subband should be divided into 1.25 MHz channels. This will prevent overconsumption of spectrum by any one transmitter, and will support the needs of a variety of services and technologies. The regulations should allow for channels being subdivided to support narrowband voice technologies.

In order to prevent large portions of the voice subband from being utilized by primarily data oriented services. Rose urges the Commission to restrict data services in the voice subband to only those provided by voice products. This is consistent with wired telephony products available today, where relatively low speed data services are available as a part of the telephone system.

Finally, and of the utmost importance, are the regulatory issues surrounding licensed PCS. These complex issues must not be allowed to impede the swift delivery of unlicensed PCS equipment to consumers. The unlicensed PCS allocation should, therefore, be unbundled from the licensed PCS and the industry should be allowed to proceed swiftly to the marketplace.

Before the FEDERAL COMMUNICATIONS COMMISSION RECEIVED Washington, D.C. 20554

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Amendment of the Commission's Rules to Establish New Personal Communications Services

GEN Docket No. 90-314 ET Docket No. 92-100

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COMMENTS OF ROSE COMMUNICATIONS, INC.

FEDERAL COMMUNICATIONS COMMISSION OFFICE OF THE SECRETARY

I. INTRODUCTION

Rose Communications, Inc. ("Rose") respectfully submits its comments in response to the Commission's Notice of Proposed Rule Making (NPRM) on Personal Communications Services (PCS).

Rose is a wireless technology company with its primary focus on the unlicensed voice and the low speed data market. Rose's first product is the MicrocelTM 2400 Wireless Business Phone System.

This system operates under the FCC's part 15 rules that permit low-powered devices to operate on an unlicensed basis.

Rose is one of the first technology companies to capitalize on the technical flexibility and benefits inherent in the revised Part 15 rules. Further, Rose is one of the few companies in the industry to exploit the 2.4 GHz spectrum for an office telephony application.

Rose has been very active in the PCS regulatory proceeding.

Rose filed policy and technical comments at every point in the proceeding including the PCS En Banc¹ hearing held late last year. In addition, Rose has taken an active role in the industry forum established specifically to address issues in the unlicensed PCS band the -- Wireless Information Networks Forum (WINFORUM).

Rose's experience in developing, producing and marketing a wireless office phone system in the 2.4 GHz band is particularly applicable to the instant situation of this PCS NPRM. The Commission proposed to allocate spectrum in the 2 GHz band to unlicensed service under revised Part 15 rules. Rose has gained valuable experience from its propagation analysis and development of a 2.4 GHz product. In addition, Rose has studied issues related to capacity versus spectrum trade-offs and the interplay between voice and data in the same band. This experience will be valuable as the industry and the Commission examine the various options to reach a conclusion on the configuration and structure of the unlicensed PCS band.

In this respect, Rose will confine its comments to the unlicensed PCS band -- the particular area of its expertise. Rose will provide direct observations concerning the amount of spectrum allocated to this service and the prospects for voice and high-speed data systems co-existing in the same spectrum.

¹ FCC En Banc Hearing on Personal Communications Services, December 5, 1991

II. DISCUSSION

A THE SPECTRUM ALLOCATION PROPOSED IN THE NPRM FOR UNLICENSED OPERATION IS INSUFFICIENT.

In the NPRM, the Commission proposed to allocate 20 MHz of spectrum for unlicensed operation by PCS devices. The proposal requires that high-speed data and voice systems share or divide the 20 MHz allocation. This proposed allocation is simply not large enough to satisfy the enormous demand for voice-based wireless office systems that will dominate this band, let alone both voice and data.

Numerous studies over the last three years have underscored the demand for wireless office systems and particularly for wireless voice systems. A.D. Little has conducted several studies in the PCS area. In their 1991 PCS Delphi Research Project, they found that nearly 70% of those surveyed expect wireless PBXs to penetrate 20% of all business establishments (emphasis added) by 1998.² Alexander Resources, an Arizona-based management consulting firm conducted a survey last year to examine wireless in-building markets. The firm surveyed 300 businesses and concluded that 30% of businesses will have wireless telephone systems by 1997.³ Economic and Management Consultants International Inc. (EMCI) a management and

² PCS Delphi Research Project, Final Results, Arthur D. Little October 9, 1991

³ Opportunities in the U.S. Wireless In-Building Business Communications Market. Alexander Resources, Scottsdale, AZ, December, 1990.

consulting firm found similar results in a study of the penetration of wireless office telephony. In offices with over 400 lines they estimated the penetration to be over 26%. They also projected the total market demand over a five year period to be 11 million lines.⁴

In addition to the tremendous demand for wireless office systems, studies further conclude that demand for wireless voice systems far exceed the demand for wireless data. Insight Research Corp. which compiled surveys examining the potential for wireless telephone systems in offices concluded "...the adoption of wireless voice technology will come at a swifter pace than the adoption of wireless data communications." They went on to say: "Although there is currently a great deal of technological innovation in this area with regard to data communications, the bulk of the market in unit shipments and revenues as well as profits will lie with voice communications throughout the forecast period." The same conclusion is echoed in several other studies.

The demand for wireless office telephone systems will require a substantial block of spectrum from the beginning. The 20 MHz block serving both voice and data that is proposed in the NPRM is simply not enough spectrum. Rose identified a need for 40 MHz for wireless

⁴ U.S. Office Telephony Systems 1991. Economic and Management Consultants, Inc. Washington, D.C., June 1991 at 14.

⁵ In Building Wireless Communications: The Stepping Stone to PCS. Phillips Business Information, Inc. (1992) at 9.10.

office systems in its filings in the emerging technologies proceeding.⁶
The needs for at least 40 MHz has been well documented elsewhere.
Hatfield and Associates concluded that at least 40 MHz would be needed for in-building services.⁷ Similarly, the AT&T witness at the En Banc hearing last December supported the need for 40 MHz and several other commentors in the emerging technologies docket echoed similar concerns about the amount of spectrum needed.

The spectrum needed for voice services is driven both by the marketplace demand and the need to ensure that first produced systems are accepted by the marketplace. The wireless office market will spearhead and come before the arrival of licensed PCS. In this sense, it will serve as a proving ground and an incubator for licensed PCS.

However, there are obstacles facing the PCS equipment suppliers in the unlicensed band. This point was made by Phillips Business Information, Inc.

"Providers of wireless offices will have to jump hurdles including quality of sound and interoperability of the phone system. No one is going to support a telecommunications system that drops calls or cannot complete a transmission."

⁶ ET Docket No. 92-9, Rose comments at 10 (June 1992).

⁷ Hatfield & Associates prepared a study of spectrum needs for PCS. This study was provided to the Commission by FMR Corp. in July 1991

They went on to say that manufacturers must implement the most spectrum efficient technology or "...the possibility of wireless applications will become history before it has had an opportunity." (emphasis added)8

To be successful, PCS equipment developers for the unlicensed band must have sufficient spectrum to allow them to optimize the spectrum efficiency characteristics of their specific application. They must also be allowed to design their systems to operate interference free in the 2 GHz band which is shared with fixed microwave users.

The success of unlicensed PCS technology in the office environment will foretell the success of licensed PCS in the wider marketplace for licensed PCS. Voice-based systems require adequate discrete spectrum to meet the marketplace demand for cost effective and high quality voice systems. The proposed allocation for unlicensed PCS should therefore be increased by a minimum of 20 MHz to 40 MHz and voice systems should be allocated at least 30 MHz of the unlicensed PCS band. Further, we believe the Commission should make provisions to expand the initial allocation for unlicensed PCS in contiguous spectrum such that should the market evolve as forecasted a total of 80 MHz of contiguous spectrum would be available for unlicensed voice and data PCS. Rose believes that the full 80 MHz will be required based on current industry projections for adoption rates of wireless technology and the size of the projected available markets in voice and data by the end of this decade. This spectrum reserve will allow the industry to provide cost effective, high quality

⁸ Supra footnote 5, at 30

solutions that meet the demands of a rapidly growing unlicensed PCS market.

B. THE COMMISSION SHOULD SEPARATE VOICE (AND VOICE BAND DATA) AND HIGH-SPEED DATA INTO SEPARATE SUBBANDS.

The initial difficulties facing unlicensed PCS should not be further exacerbated by the need to share a band between two very disparate services. Asynchronous data networking is a bursty type of service that does not require a real time connection. Voice, on the other hand, is continuous and periodic (isochronous) once the connection is established. Further, the period of connection is unknown and potentially exists for long periods of time. Additionally, retransmit schemes under conditions of delay or interference are not tolerated by real-time voice systems.

Likewise, the environments in which each service operates contrast. Equipment developed for voice-only services can tolerate more interference than equipment required to support high-speed data connections. Voice systems normally perform well with bit error rates as high as 10⁻³, while high-speed data systems require a more benign environment with bit error rates no worse than 10⁻⁷ and preferably better.

Rose and the WINFORUM's technical committee explored the possibility of a methodology which would permit overlayed sharing of spectrum by asynchronous data services and isochronous voice

services. Neither Rose nor WINFORUM is recommending such an approach. Of several approaches which were evaluated, all added substantial cost and complexity to the product. This would delay introduction of products into the marketplace, increase their cost, and may diminish their market acceptance.

Most significantly, all such approaches proved far from effective in protecting voice services from degradation in the form of dropped calls and inferior voice quality. The several real-time characteristics of voice, including indeterminate duration, low delay tolerance, inapplicability of retransmit schemes, etc., could simply not be harmonized with the characteristics of asynchronous data services. This difficulty is compounded by the recognition that many data services would have spectral widths which would subsume many or all of the voice channels (e.g. 10 MHz).

This was the same conclusion reached by Dr. David Nagel, Senior Vice President, Advanced Technology Group of Apple Computer during the FCC's En Banc hearing last December. Apple is one of the founding members of the WINFORUM and a pioneer in the development of the Data-PCS concept.

Dr. Nagel said in discussing spectrum requirements: "Voice PCS systems cannot be used for or share frequencies with Data-PCS." In support of this conclusion he asserted "For financial and service considerations, voice PCS must be optimized for real-time, interactive

conversations and, when it is, it is incompatible with Data-PCS's needs..." He further said:

"Packetization is the key technology required for effective transmission of computer data, while voice connectivity essentially requires a connection of continuous, so called 'circuit switched' nature. These fundamentally different demands upon the medium make optimizing a single technical and regulatory approach extremely difficult."

We agree with Apple and request the Commission to separate the two services into separate subbands. The exact amount of spectrum required for each band should reflect the market demand for the separate services. The demand for voice services has been established and Rose recommends the Commission consider the record developed in support of 40 MHz.

C. THE COMMISSION SHOULD DIVIDE THE VOICE SUBBAND INTO 1.25 MHZ CHANNELS.

The Notice proposes that the 20 MHz be subdivided into three blocks: one block of 10 MHz for broadband technologies, a 5 MHz block divided into four 1.25 MHz blocks and a five 5 MHz block divided into 100 KHz blocks.¹⁰

⁹ Written testimony of Apple (Dr. David Nagel) at 7.

¹⁰ Amendment of the Commission's Rules to Establish New Personal Communication Services. GEN Docket No. 90-314, ET Docket No. 92-100, at para. 44.

The data service companies within WINFORUM have generally stated a preference not to channelize that portion of the band allocated to data services, and Rose supports their approach.

However, for the subband which is allocated to voice services, Rose recommends two important requirements: 1) that various voice services, even those of differing spectral widths, share the band in an overlayed fashion; and 2) that the subband be divided into 1.25 MHz channels. These recommendations are completely consistent with those of the seven companies actively participating in WINFORUM's Voice Subcommittee.

As regards channelization, it is important to create a sufficient number of channels for several purposes. First, in a multi-cellular environment (e.g., a wireless PBX serving a large building) enough channels must be available to permit a workable frequency reuse pattern. Second, in situations where there is some contention for spectrum by neighboring systems of non-homogeneous design, there must be enough channels available to permit reasonable coexistence.

Of critical importance is the stipulation that no single transmitter can occupy more than one channel. Otherwise, a "hogging" phenomenon can occur which undermines the operation of such voice systems.

Rose believes that channels of 1.25 MHz will meet these requirements and will also permit bit rates adequate for effective

TDMA or direct sequence spread spectrum approaches. Narrow band voice services, such as those which resemble CT-2, may divide the channels into subchannels of 50 - 100 KHz.

Rose believes the above channelization will work provided that voice and low speed data are separated from the high speed data bands by regulation and that the voice etiquette includes a "LBT" (listen before talk) protocol. Further, the issue of maximum transmit power levels should be addressed by the Commission. Here, it is critical to the issue of innovation and technological competitiveness that the power levels are comparable for all technical approaches. A significant amount of discussion and debate has occurred within the WINFORUM technical committees in this regard. Rose believes their recommendation which relates power to bandwidth (Power limit = 10⁻⁴ watts/square root of the bandwidth in Hz) provides a level playing field for all anticipated technological approaches. In any event, final details on the etiquette and channelization should not be dictated by regulatory fiat, it is best left to the cooperative efforts of industry.

D. DATA SERVICES WITHIN THE VOICE SUBBAND SHOULD BE ALLOWED ONLY AS A SECONDARY SERVICE OF A VOICE PRODUCT.

In order to prevent large portions of the voice subband from being utilized by primarily data oriented services, Rose urges the Commission to restrict data services in the subband to only those provided by voice products. This is consistent with wired telephony products available today, where relatively low speed data services are available as a part of the telephone system.

This restriction insures against disruption of voice services, which, if allowed, would limit their market potential. To achieve the full promise of wireless voice in the business environment, the service must have quality and reliability equal to the telephone service provided by the local exchange providers.

E. THE COMMISSION SHOULD UNBUNDLE REGULATORY CONSIDERATION OF THE UNLICENSED PCS FROM THE LICENSED PCS.

Prolonged debate over regulatory issues associated with licensed PCS should not be allowed to impede the delivery of equipment and services within the liberal structure developed by the Commission for unlicensed services under a revised Part 15.

This theme was underscored by the comments of Dr. Charles Jackson, NERA, a witness at the Commission's En Banc hearing last year. He said that "If the FCC cannot act swiftly on PCS as a whole, then you should unbundle the issues and act swiftly on those issues where you can act."11

¹¹ Testimony of Dr. Charles Jackson during En Banc hearing.

The issues associated with licensed PCS are difficult and contentious. For example, license eligibility, the licensing mechanism, federal and state regulatory issues, interconnection, local loop competition and technical compatibility will all require serious deliberation. These deliberations will, without a doubt, take time and equally doubtless, they are not relevant to unlicensed service.

If unlicensed and licensed PCS issues remained bonded together the resulting delay would not only impact the equipment manufacturers ready to commit significant capital to this marketplace but would have a major impact on the U.S. economy as well. For example NERA, in testimony before the En Banc hearing, estimated the cost of the regulatory delay in not deploying cellular as soon as possible at \$86 billion. In written comments NERA stated that "The stakes here (in the PCS proceeding) are roughly similar." 12

Separating unlicensed PCS from licensed PCS will allow wireless services to reach consumers expeditiously. The costly delays experienced in bringing cellular to the marketplace need not be repeated in PCS. Once the spectrum allocation issues and the sharing and transition issues are settled, the Commission should separate the unlicensed from the licensed PCS and move directly to a final order for unlicensed PCS. The question of sharing spectrum between PCS and the existing fixed Part 94 users of the spectrum should also be approached by the Commission in a manner that separates unlicensed

¹² Written testimony of Dr. Charles Jackson, executive summary.

PCS from licensed PCS. Licensed by definition is a wide area public radio offering that presents much more significant issues vis a vis interference with existing users than does private unlicensed PCS applications.

The vast majority of unlicensed PCS systems will operate as inbuilding systems. Given that reasonable power limits are established for unlicensed PCS, the closed office or factory environment contains natural RF shielding (walls, floors, etc.) against interference either from or to Part 94 users. Likewise, given the maximum bandwidth of a Part 94 user, an intelligently implemented, unlicensed PCS system would avoid interference, should it occur, by changing to a frequency within its band which is not being utilized by the Part 94 user. The practicality of this approach is demonstrated by the first WTOS system available in the U.S. market, the Rose Microcel™. This system operates in the 2.4 GHz to 2.4835 Ghz band of Part 15 as a secondary user and employs interference countermeasures including channel changes to avoid interference and insure high quality and high reliability voice communication. We believe rapid deployment of unlicensed voice and low speed data PCS into the proposed spectrum can be accomplished with little, if any, disruption to existing users. This could be done on an interim basis by making the unlicensed voice PCS service a secondary user under regulatory provisions similar to those found in the current Part 15 regulations.

III. CONCLUSION

Rose strongly urges the Commission to move quickly to establish the rules on the critical spectrum and shared use issues in the unlicensed band, and to place the accomplishment of final rules on a regulatory fast track.

U.S. leadership in the international wireless telecommunications marketplace is at stake in this proceeding and needless delay could jeopardize that position.

Respectfully submitted,

President and CEO

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November 6, 1992